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ABSTRACT

This study analyzed the grammatical features of two classes of words in Japanese, adjectives and adjectival nouns. Both have functions similar to those of English adjectives, but their behaviors differ syntactically or morphologically from each other. Differences in psychological processes, evident in both lexical retrieval processes and native speakers' errors, are examined. Data are drawn from two sources: elicited "tip-of-the-tongue states" and naturally occurring speech errors in sentence production. Subjects for the first data elicitation were 24 native Japanese speakers, who were provided with 50 written definitions (25 adjectives and 25 adjectival nouns) and asked to give specific information about each. Data in the second analysis were derived from a corpus of 3,300 naturally-occurring speech errors Results support a dual-stage model of lexical retrieval assumed in many sentence production models, but also emphasize the distinctiveness of the two categories during the early stages of sentence production, suggesting that the differences between adjectives and adjectival nouns are syntactic. Contains 18 references. (MSE)

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Adjectives and Adjectival Nouns in Japanese: Psychological Processes in Sentence Production

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1. Introduction[1,2]

This paper provides psychological analyses of the grammatical features of two classes of words in Japanese: adjectives (*keiyooshi*) and adjectival nouns (*keiyoodooshi*). These two classes of words both possess functions similar to English adjectives; however, their behaviors differ syntactically and/or morphologically from each other. Their differences in psychological processes are examined in this paper, differences which are evidenced both in lexical retrieval processes and in native speakers' speech errors.

2. Adjectives and Adjectival Nouns

In Japanese, in order to make up for the lack of sufficient development of the class of adjectives (e.g., inconsistent conjugation, insufficient number of entries), and to accommodate words borrowed from Chinese, the class of *keiyoodooshi* (literally, 'adjectival verbs') developed (e.g., Mizutani 1951, Yamaguchi 1981). However, whether to accept *keiyoodooshi* as an independent class remains controversial (e.g., Kageyama 1993). Mizutani, for example, argues that *keiyoodooshi* is a subset of the class of nouns,

[1] This research was funded by the Cognitive Science Program of the University of Arizona.

[2] We are grateful to Yasushi Terao for allowing us access to his data, and to the audience at Cornell University for their helpful and insightful comments.

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while Sells (1996, to appear) and Nishiyama (1997, this volume) argue that *keiyoodooshi* is a subset of adjectives which differ morphologically from canonical adjectives. Following Martin (1975) and Kageyama, we will hereafter call this group of words 'adjectival nouns.'

Due to the early historical development of adjectives in Japanese, there is a tendency for basic attributes and emotions to be described by adjectives. However, lower frequency words with non-basic meanings may be either adjectives or adjectival nouns. Hence, the grammatical categories of infrequent words are not predictable from the word's meaning. We examine the behavior of these two classes of words in psychological processes, i.e., in lexical retrieval and in speech errors, for evidence bearing their relations to grammatical structures.

3. Speech Production Models and Our Data

In this paper, adjectives and adjectival nouns are analyzed in two types of data: experimentally elicited 'tip-of-the-tongue states' and naturally occurring speech errors. Both 'tip-of-the-tongue' states and speech errors have been primary sources of data in the study of sentence production.

3.1 Tip-of-the-Tongue States

Most models of lexical retrieval in sentence production (e.g., Levelt 1989) include two stages, as shown in Figure 1 below. Speakers first retrieve an abstract representation of a word that is assumed to specify syntactic features of the word (lemma); subsequently, they retrieve a phonologically specified lexical representation (lexeme).[3] The retrieved syntactic information is utilized for grammatical encoding (i.e., syntactic building procedures).

Speakers occasionally fail to retrieve some words, even though they feel certain that they know the target words. Such tip-of-the-tongue (TOT) states (or *nodo made dekakaru kotoba no gensyoo*) may be thought of as the speaker having access to lemmas, but not the corresponding lexemes. Vigliocco et al.'s (1997) work has shown that Italian speakers in TOT states can have access to syntactic information such as grammatical gender regardless of whether they produce sound information about the target. However, such empirical evidence supporting a dual stage process of lexical retrieval remains scant. The behaviors of Japanese adjectives and adjectival nouns, reported here, provides further evidence for such dual processes.

3.2 Speech Errors in Psycholinguistics

In the last few decades, the study of speech errors has provided insights for psycholinguistic and linguistic research on language mechanisms. Both

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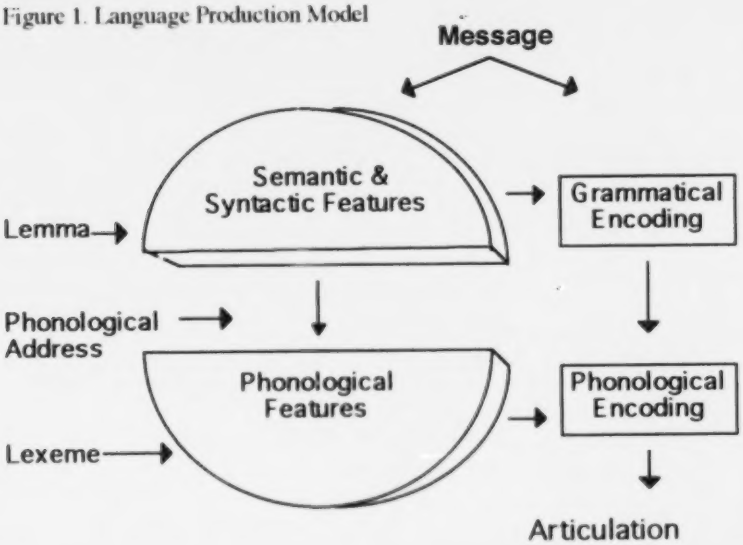
[3] Morphological features are also assumed to be specified in lexemes (Levelt 1989).

naturally-occurring errors and experimentally elicited errors have been utilized. The analysis of speech errors reveals planning units in speech which are compatible with units of analysis in linguistics; the evidence indicates a substantial correspondence between units in linguistics (e.g., phonemes, morphemes) and the units used in producing utterances. Furthermore, by examining the constraints on types of speech errors, models of sentence production have been constructed (e.g., Fromkin 1973, Garrett 1975). Our examination of corpora of Japanese speech errors provides a complementary set of constraints to our analysis of experimental TOT data.

Figure 1. Language Production Model



4. Tip-of-the-Tongue Study: Lexical Retrieval Processes

4.1. Experiment: Materials and Procedure

The written definitions of 50 words (25 adjectives and 25 adjectival nouns) were provided to 24 native Japanese speakers (age 24-40, 18 females and 6 males). Participants were paid six dollars for their participation. Low frequency words which most Japanese native speakers may be familiar with were selected as target items.[4] The experiment was administered individually,

[4] The target words in the experiment included adjectives like *hutebutesii* 'impudent' and adjectival nouns like *nagoyaka* 'congenial.' Definitions of the selected words were

and each session took approximately one and a half hours. When participants could not retrieve a target word, they answered the following questions:

(1) Items on the Information Sheet

a. Rate how well you know the word on a scale of 1-5.
b. Guess the grammatical category of the word: Adjectives or Adjectival Nouns (See below).
c. Guess the number of hiragana in the word (if the word is to be written out in hiragana).
d. Guess the orthography of the word; whether the word is commonly written in hiragana or kanji, and the number of kanji characters.
e. Note any other information about the word.
f. Note any other words that come to mind.
g. Determine whether the word the experimenter provides (after filling out all the other parts of the information sheet) is the word you had in mind.

They were first asked how well they felt they knew the words at the time the definitions were presented to them. If participants had absolutely no idea what the target word was, their rating was '1.' If they felt that they could perhaps retrieve the target words, they rated the degree of knowing from '2' to '5,' with '5' being the literal sense of 'tip-of-the-tongue.'

For the examination of grammatical category information (Question b above), the four pairs of sentences with blanks shown in (2) were provided. Half of the sentences would be grammatical if the blanks were filled in with adjectives, and half would be grammatical only if filled in with adjectival nouns.

(2) sentences used for the assessment of grammatical categories[5]:

(i) (a) _____ kute, ii to omotta. *or* (a) _____ kute, iya datta.
(b) _____ de, ii to omotta. (b) _____ de, iya datta.
'Being _____, I thought that (it) was good.' or
'Being _____, (I found it) unfavorable.'

(ii) (a) Amari _____ zya nai.
(b) Amari _____ ku nai.
'(It) isn't very _____.'

(iii) (a) Zuibun _____ ku natta.

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modification of definitions in two dictionaries (*Gendaikokugo Reikai-ziten* by Syougakkan, 1989; *Sinmeikai Kokugo-ziten* by Sanseidoo, 1991).

[5] These were originally in Japanese script, but the sentences are romanized and supplemented by English translation here.

(b) Zuibun _____ ni natta.
'(it) became quite _____.'

(iv) (a) _____ datta to omou.
(b) _____ katta to omou.
'I think that (it) was _____.'

In order to examine the availability of the target word's phonology, segmental information and the number of moras were assessed. Participants were asked to guess how many hiragana characters the target word would consist of. This item was to examine if participants had access to the mora information since the number of hiragana always matches the number of moras. Also, participants were asked to provide any information that they had about the word, including partial phonological information. When participants produced alternative words, phonological similarities between the alternative words and the target words were examined. When an alternative word shared more than one phoneme with the target word, the subject was considered to have some phonological information of the target word.

4.2. Predictions

If Japanese adjectives and adjectival nouns are retrieved in a dual stage process as outlined in Figure 1, and if TOT blockage occurs between lemma and lexeme, it is predicted that the grammatical information of words should be available during TOT states. That is, participants should know the grammatical categories of the target words (i.e., whether the target words are adjectives or adjectival nouns). More strongly, such information should be available even when the speaker has no phonological information for the target word.

4.3. Results and Discussion

Since there were 50 target words for 24 participants, there were total of 1200 lexical retrieval trials. As shown in Table 1, only in 492 instances did participants retrieve the intended target words or near synonyms that they believed were the targets. In the remaining 708 instances, participants were asked questions according to the data sheet described in (1) and (2) above. There were only eleven instances of a rating of '5.' In the following analysis, any lexical search with some feeling of 'knowing' (e.g., rating of '2' to '5')[6] will be included in the analysis, under the assumption that the

[6] Occasionally, participants first claimed that they absolutely had no idea what the target word would be, but felt that the intended word the experimenter provided after the information sheet was filled out was their own target of lexical search. This indicates that while filling out the information sheet, the subject came to have closer access to the target

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participants were in the process of a lexical search. At the end of each trial, the experimenter provided the intended target word. Depending on whether the participants agreed that the target word intended by the experimenter was the same as their target word, their TOT states were classified as "positive TOTs" or "negative TOTs." Positive TOTs were defined as those cases in which participants rated their knowledge of the target word from '2' to '5,' and in which they recognized the experimenter's target word as the one they were searching for. Negative TOTs were defined as either those cases in which participants rated their knowledge of the target word as being '1,' or those cases in which they did not recognize the experimenter's target word as being their own target. In other words, these negative TOTs include two different situations: situations in which the participants had no idea as to what the target would be and made no attempts to search for words, and situations in which participants were searching for words which differed from those that the given definition was intended for. As far as grammatical guesses are concerned, these two types of cases did not significantly differ from each other (t-test: t=-0.78, df=535.07, p=0.44); thus, these two types were collapsed for the following analysis. The numbers and percentages of responses for positive and negative TOTs as well as for correct responses are reported in Table 1.

Table 1. General Results

Target Forms Retrieved[7]	492 (41.0%)
Positive TOTs	151 (12.6%)
Negative TOTs	557 (46.4%)

We assume that although the participants in negative TOT states had the conceptual information given in the definitions, they had no systematic source of knowledge with regard to the target words that we had intended. On the other hand, speakers in positive TOT states must have had access to partial lexical information. Hence, the differences between the partial information retrieved during positive TOTs and that retrieved during negative TOTs provide a test case. If grammatical category information is retrieved during the search for a target word, a speaker in a positive TOT state should be able to report it correctly more often than speakers in a negative TOT state. During positive TOT states, the grammatical category of the target words were guessed correctly 74.5% of the time, while the grammatical category guesses during the negative TOT states which corresponded to the

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word. There were 15 instances of such cases, and these were also included in the number of TOT states.

[7] In this analysis, when the subject retrieved a synonym, and believed that it was the target for the definition, she/he was considered to have retrieved a 'target' word.

grammatical categories of the experimenter's target words were at chance level, occurring only 48.7% of the time (Table 2). Hence, the participants in positive TOT states had access to syntactic knowledge for the target words.

With regard to information other than grammatical category, participants failed to guess the number of moras contained in the target words most of the time. On the other hand, participants' guesses about orthography were relatively good, when compared with the guessing of the number of moras (see Table 2).

Table 2. Retrieval of Correct Information

	Positive TOTs	Negative TOTs
Grammatical categories	74.5%	48.7%
Number of Moras	33.1%*[8]	24.6%*
Orthography	65.7%*	44.3%*

The guesses with regard to grammatical category of target words were further analyzed, according to the categories of the target words (adjectives and adjectival nouns). Table 3 shows the numbers and proportions for guesses in each class both during positive and negative TOT states.

Table 3. Guesses on Adjectives/Adjectival Nouns: Overall

	Positive TOT		Negative TOT	
	Adjective Target	Adj.Noun Target	Adjective Target	Adj.Noun Target
Adjective Guesses	**46**[9] **(70%)**	19 (23%)	**122.5 (41%)**	112 (44%)
Adj.Noun Guesses	20 (30%)	**63 (77%)**	175.5 (59%)	**145 (56%)**

(Correct responses per subject for the positive TOTs and the negative TOTs: ANOVA $F(1,21)=21.8$, $p< .0001$)

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[8] The asterisks indicate that there exist some problems for determining whether the participants' guesses on number of moras and on orthography are correct. For the guessing of the number of moras for adjectival nouns, some participants may include *-na* (the element that is only required when adjectival nouns are used for prenominal modification). The status of *-na* in the mental lexicon, whether it is stored as an independent item or stored as a part of 'inflected' words, would require further research. In terms of orthography, many words may be written in several different ways by adults. That is, it is both natural to write some words all in hiragana or in a combination of hiragana and kanji. Thus, the orthographic representation of such words in the mental lexicon may differ among individuals; consequently, the 'correct' guess would also differ depending on the individual.

[9] Correct responses to all four sentences (2i-2iv) are scored as '1' correct guess in this analysis. The participants were usually very consistent in their responses; if they felt that the target word would fit in the blank in (2-i-a) (i.e., the adjective target), they consistently chose (2-ii-b), (2-iii-a) and (2-iv-b). When the responses were not consistent, each response was scored as '0.25'.

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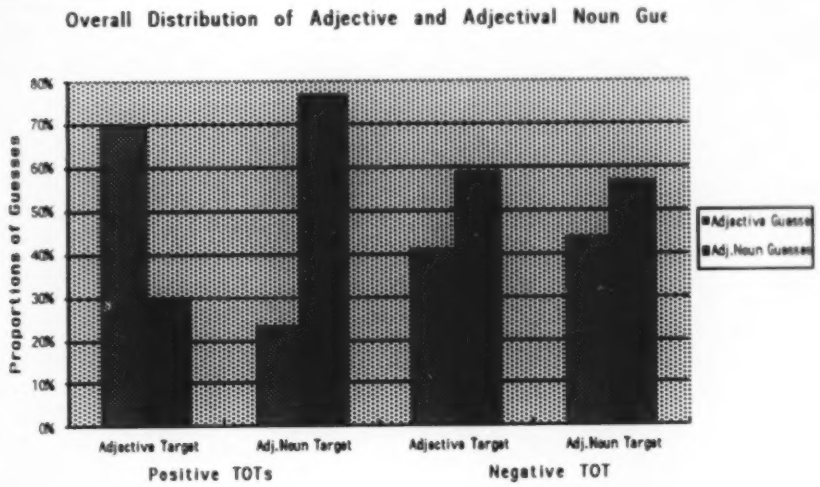
The same data are depicted in Figure 2. The rates of correct grammatical guesses when the targets were adjectives during positive TOT states and during negative TOT states were 70% and 41%, respectively. When the targets were adjectival nouns, the correct grammatical guesses in positive and negative TOTs were 77% and 56%. The difference of the correct percentages between positive and negative TOTs is statistically significant (t test: t=6.48 df=260.80 p=0.02).

We also observed a tendency towards guessing that the target word was an adjectival noun (as is shown in Figure 2). There seemed to be a preference for sentences containing blanks to be filled with adjective nouns (or nouns) when participants were uncertain. This suggests that a rate of 70% adjective guesses for the adjective targets is robust as it runs against some baseline bias for the adjectival noun category.

Figure 2[10].



These findings are consistent with the hypothesis that syntactic information is lexically specified. We now examine the stronger prediction that grammatical category information is available to a speaker even if the phonological shape of the target words is not known at all.

In the general model (Figure 1), grammatical category information must be available even when orthographic and phonological information is not

[10] In Figure 2 and 3, the left bar in each pair indicates the percentage of adjective guesses, and the right bar indicates the adjectival noun guesses.

retrieved. This model distinguishes between two levels of lexical information: first, an abstract representation of the word that specifies the semantics and syntax (i.e., lemma); second, a phonological representation of the word (i.e., lexeme). Presumably a separate orthographic representation would also belong to this latter level. This modality specific information (orthographic and phonological) would be retrieved after the abstract forms of the words are activated and selected (Levelt 1992). TOT states would consist of successful retrieval of the abstract representation, while fragmentary information regarding the word form may or may not be available. If this is the case, then speakers in positive TOT states who could report any phonological or orthographic information should still be able to correctly guess the grammatical category of the target words. The status of orthography in the mental lexicon will not be discussed here; however, it is apparent that the availability of the knowledge that the target word consists of two kanji (Chinese characters) may enable the participants to guess correctly that the target word is a Sino-Japanese compound, and therefore that it is an adjectival noun. We exclude instances in which the correct orthographic information became available to the participants.

Thus, in this conservative analysis, three types of instances were excluded from the TOT states analyzed above: (1) instances in which some phonological information was available; (2) instances in which correct orthographic information was available; (3) instances in which the target words were retrieved before completing the information sheet. Table 4 shows the results of this analysis.

Table 4.

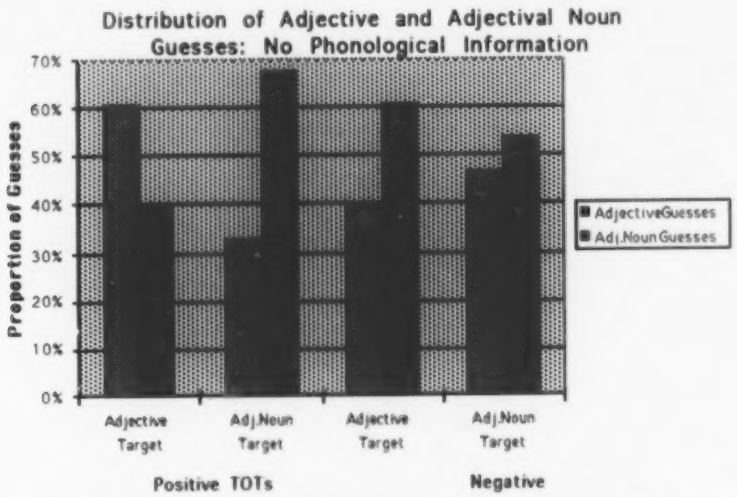
	Positive TOT		Negative TOT	
	Adjective Target	Adj.Noun Target	Adjective Target	Adj.Noun Target
Adjective Guesses	**8.5 (61%)**	7.5 (33%)	**44.25 (39%)**	64.5 (46%)
Adj.Noun Guesses	5.5 (39%)	**15.5 (67%)**	68.75 (61%)	**74.5 (54%)**

(Correct responses per subject for the positive TOTs and the negative TOTs without phonological information: ANOVA $F(1,18)=3.4$, $p=0.08$)

Although the quantity of data is small, the data show that participants' guesses in positive TOT states had a much higher percentage of accuracy. Statistically, the difference of accuracy between positive and negative TOT states was marginally significant ($p = 0.08$). Figure 3 illustrates these results. A conclusive statement regarding the stronger prediction would

require a larger quantity of data; however, there is some evidence that participants can guess the correct grammatical categories. The results of this experiment indicate that participants often had access to grammatical information without retrieving the phonological forms of the words. These data provide evidence from Japanese which is compatible with a dual stage model of lexical retrieval, and which corresponds to other findings which were based on studies in Italian.

Figure 3.



Furthermore, the distinctive features of adjectives and adjectival nouns are evidencedin lexical retrieval processes. It is apparent that the distinctiveness of these two class of words are reflected in the early retrieval processes in sentence production.

In the following section, we further examine the behaviors of adjectival nouns in native speakers' speech errors (i.e., slips of the tongue) in relation to those of adjectives and nouns, in order to investigate the behaviors of adjectival nouns in psychological processes from a different perspective.

5. Analysis of Naturally-Occurring Speech Errors

5.1. Data

We analyzed the speech error corpus collected by Terao (1995). This corpus includes 3300 naturally-occurring speech errors recordedby the author. These

errors are what the author encountered in personal communication, media (television or radio) or in other forms of communication. We also analyzed a smaller corpus (consisting of 367 observations) collected by Iwasaki.

5.2 Exchange Errors

Several types of speech errors have been reported in the literature (Garrett 1975, Fromkin 1973): exchange errors, substitution errors, shifts, stranding, and blends. Here, we focus on exchange errors. In these errors, two units, such as the sound units (i.e., moras or syllables) as in (3a) and words as in (3b-c), exchange.

(3) a. iguRISU[11] takusan aru yo.
(intended: 'igusuri,' stomach medicine)
'I have a lot of stomach medicine.'

b. mazu, KOMUGIKO de DASI-ZIRU o toi-te ne.[12,13]
first flour INSTR soup-stock ACC dissolve-GERUND right
(intended: 'mazu, dasi-ziru de komugiko o toi-te ne.')
'First, dissolve flour in soup stock, right.'

c. are NOTte HAKA-hen-kattara ee n ya.
that board-GERUND wear-NEG-CONDITIONAL good nominalizer copula
(intended: 'are haite nora-hen-kattara ee n ya.') (Kansai dialect)
'it'll be fine as long as you don't wear that (referring to a skirt) when you board a plane.'

These types of errors have paramount importance in the study of sentence production, in that they indicate the simultaneous existence of target elements from two locations, and hence directly implicate sentence building procedures (Garrett 1975). Word exchange errors such as (3b) and (3c) are relevant to our current discussion; word exchange errors, as well as word substitution errors, are usually the interaction of two words of the same grammatical category in English, German and Spanish corpora (Garrett 1975, Garcia-Albea et al. 1989). Phonological similarities between exchanged words are occasionally observed, and these similarities may raise the likelihood of the occurrence of exchange errors. Terao (1989) reports 22 word exchange errors like (3b), and 16 of what he calls 'stem exchange errors' such as (3c) in his corpus. There are three full word and four stem exchanges in Iwasaki's corpus. Both exchange and substitution errors

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[11] Capitalized parts are the erroneous parts.

[12] Alternatively, you could consider this error as the exchange error of particles *o* and *de*.

[13] This error is among the errors reported by Hiroko Niioka. We are grateful for her contribution.

between two verbs or two nouns are commonly observed both in Terao's and Iwasaki's data. However, there is one case in which an adjectival noun was substituted by a noun as in (4) (Terao 1989). This error can be interpreted either as a word substitution error or an 'incomplete exchange' in which the speaker was about to exchange the two words, but monitored the error before fully articulating it.

(4) seikatu na ... (intended: *siawase na seikatu* "a happy life")

The rareness of this type of error suggests that, in psychological processes, nouns and adjectival nouns are treated as discrete classes of words. On the other hand, the existence of such an error, albeit rare, may indicate the existence of a 'noun-ness' property of adjectival nouns. Terao also reports two instances of exchange errors involving adjective stems and nouns, but points out that the exchanged words are phonologically similar words in the same phrase.[14] This suggests that these errors may be 'stranding errors,' rather than exchange errors (See Garrett 1993 for discussion).

Importantly, no exchange errors involving the interaction of an adjective and an adjectival noun have been reported. In the currently available data, adjectives and adjectival nouns seem to be distinctively processed. These two categories appear to be differentiated in psychological processes during sentence production.

Furthermore, the behaviors of closed class elements which are associated with adjectival nouns such as *na* and those associated with nouns such as *no* and *ni* indicate that these are similar linguistic units, while the adjectival inflections such as *-i*, *-ku* and *-katta* are not. As mentioned earlier, exchange errors predominantly involve words of the same grammatical class; in Terao's corpus (1995), the genitive marker *no* and the prenominal requirement of adjectival nouns *na* are exchanged, such as in (5a). Also, in (5b), *na* is exchanged with *ni*. Although elements *na*, *no* and *ni* are phonologically similar (i.e., one mora with the same initial phoneme [n]), such exchange errors are unlikely to be sound exchange errors since such sound exchanges between closed class elements are rare (Garrett 1975).

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[14] The two errors from Terao (1989) are the following:

a. kono heya-i sem:
intended: 'kono sema-i heya'
this small room

b. natu-i atu
intended: 'atu-i natu'
hot summer

In the above errors, not only the number of moras but also the vowels in the words, as well as their positions, are identical. Errors of this kind are also observed in English and are interpreted in terms of sound (not word) exchanges.

(5) a. zitu ni samazama NO ooki-sa NA danbooru ga ari-masu.
truly various GEN size boxes NOM exist-NONPAST
(intended: 'samazama na ooki-sa no...')
'there are boxes of various sizes.'

b. kiken NI zyootai NA nari-masite...
dangerous state become-DISTAL-GERUND
(intended: 'kiken na zyootai ni nari-masite...')
'(it) became a dangerous situation.'

The processing of *na* appears to pattern with the genitive marker *no* or particle *ni*, both of which can be considered to be forms of copula *da*, unlike the adjectival inflection *-i*. To our knowledge, the segment *-i* has not been reported to be involved in any exchange errors. These data suggest that adjectival nouns may be more similar to nouns than to adjectives, and that adjectival nouns are processed differently from adjectives. Thus, the classification of grammatical categories that reflects the psychological processes of adjectival nouns should differentiate the class of adjectival nouns from that of adjectives.

6. Conclusion

In this paper, two types of psychological processes involving adjectival nouns and adjectives have been analyzed. The experimental study of tip-of-the-tongue states has demonstrated that during the lexical retrieval processes, the grammatical category information of these two classes of words becomes available before the words' phonological information becomes available. Hence, the retrieval processes of these two classes of words support the dual stage model of lexical retrieval assumed in many sentence production models. At the same time, these results also demonstrate the distinctiveness of the two categories during the early stages of sentence production. This distinctiveness at the early stage suggests that the differences between adjectives and adjectival nouns are syntactic since the morphological features are assumed to be specified in lexemes, not in lemmas (Levelt 1989).

The analysis of speech errors involving adjectival nouns similarly indicates that adjectival nouns and adjectives are distinct from each other. Thus, from a psycholinguistic perspective, adjectival nouns appear to constitute an independent syntactic class of words.

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